HOTclash™
(for AVEVA's PDMS)

Installing Program

1 To install HOTclash for PDMS on Windows OS, load the product CD supplied by SST Systems Inc., and execute the followings steps:

2 Browse the CD, and run the program "SETUP.EXE" and follow the instructions as they appear on the screen.

3 Add the path of the installed directory to the "pmllib" path of the PDMS.

4 For example SET PMLLIB=C:\Progra~1\HOTclashPDMS %1\pmllib (assuming HOTclashPDMS is installed in the directory C:\Program Files\HOTclashPDMS).

Note: For the program to work properly, avoid using space or special characters while entering the path or file name.

5 Define an environmental variable with name as "HOTclash_PDMS" and the value as HOTclash Installation path.

For example, set the value as "C:\Progra~1\HOTclashPDMS (assuming HOTclash_PDMS is installed in the directory "C:\Program Files\HOTclashPDMS).

6 The environment variables required by PDMS are also required for HOTclashPDMS. The PDMS environment must exist as outlined in the appropriate PDMS Installation Guide.

7 Load PDMS and enter the Lexicon Module as a user who has Read-Write access to DICT Database and run the datal file HOTclash.DAT, to create the UDA: SUPCODE for ATTA elements, UDA :NX, :NY, :NZ and :NAL for Nozzle elements, UDA: :HNX, :HNY, :HNZ, :TNX, :TNY, :TNZ, :HNAL and :TNAL for Branch elements.

How to use HOTclash?

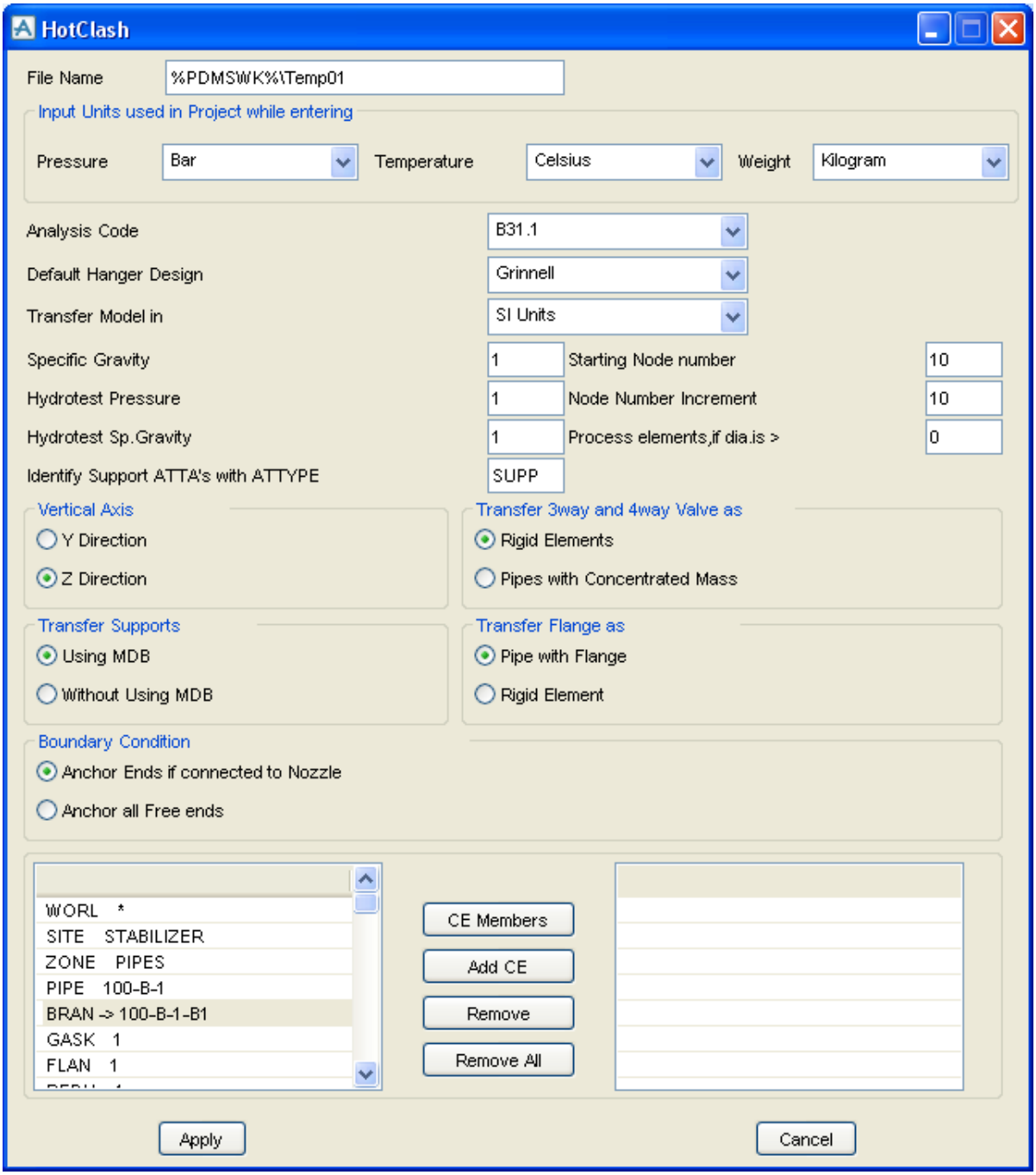
1 Add the ZONE/PIPES/BRANCHES need to be checked for stress using "Add CE" or CE Members" button.

2 Branches selected for transfer need to be checked for the following.

- TEMP, PRES attributes of the BRAN element
- Each branch should have a valid PH OD
- Each branch in the network should have a valid HSTU
- Each branch should have a component
- It is recommended to perform "DATA CONSISTENCY CHECK" for all Pipes/Branches selected for transfer.

3 For transferring the support details, ATTA's have to be created at support locations and the UDA (:SUPCODE) should be set a value as given in the field #1 (i.e., "PdSupport") of the access db "SupportType.mdb".

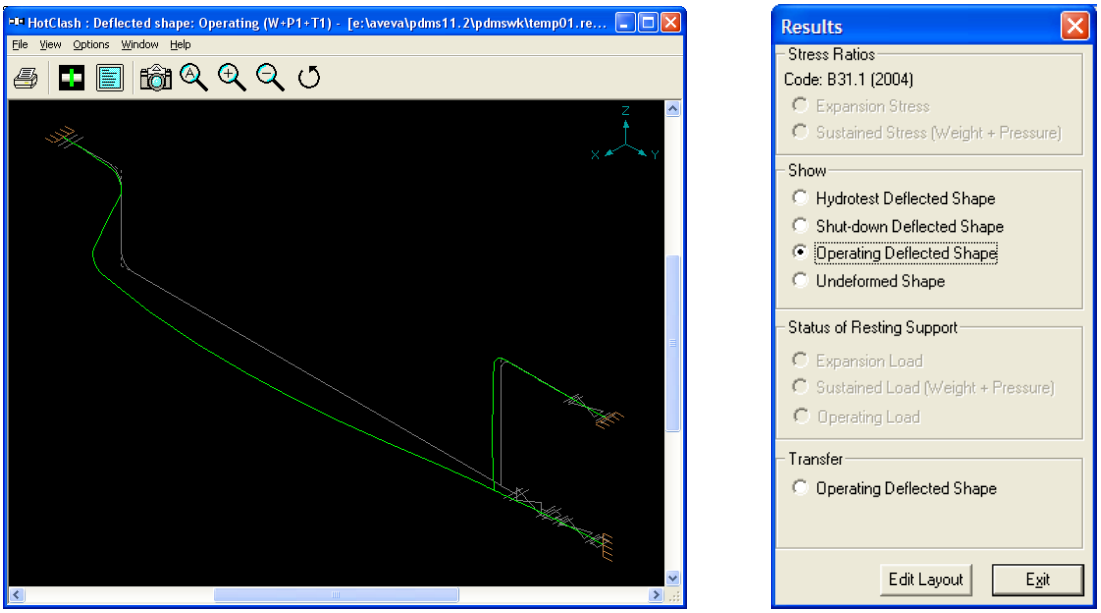
4 To use HOTclashPDMS, type "show !!HOTclash" on the command line of PDMS Design Module. The following form appears,



- Specify/Change the Name of the file if you wish. Do not leave a blank space while giving the file name / path. Program checks and generates error, if finds a space in the file name / path.

- Select the piping code to be used for the analysis of the model from the list box.
- Select the Input units used in Project while entering “Pressure”, “Temperatures” and “Weight” using the options as shown in the figure above. Please note, selecting wrong input units used in project will results in incorrect output.
- Enter the Starting Node number and Node increment value in the appropriate field. By default, the Starting Node number and Node increment are set to 10 and 10 respectively.
- Enter the Specific Gravity of operating fluid with respect to water. By default the specific gravity is set to 1.0.
- Enter the Hydrotest Pressure in bar/psi with respect to SI Units/English Units respectively as specified in the form shown above and Specific Gravity of the Test fluid in the corresponding field.
- Select Default Hanger to be used in HOTclash model. This Hanger type will be used only when the hanger type in HOTclash corresponding to Plant Design hanger is not specified/available in the Mapping DB. Refer HOTclash.pdf for more details.
- When the “Identify Support ATTA’s with ATTYPE attribute set as” is entered with a Keyword, then it will transfer support locations and its information from PDMS, only when the attribute “ATTYPE” is filled with the string that matches the Keyword entered in the form. On the other hand, leaving this text box empty (unfilled) will transfer all the ATTA from the PDMS for the selected Pipes/Branches without checking its “ATTYPE” attribute. For example, if the Keyword is specified as “SUPP” then the program will include ATTA’s for transfer, only when the ATTYPE attribute is filled with the same Keyword “SUPP”, otherwise, it excludes them from transfer.
- Select the units to be used for the HOTclash model.
    - Selecting the option “SI Units” transfers the Pipes/Branches details in SI units i.e. Length related dimensions such as OD, Nominal Size etc in mm, Temperature in Deg C, Pressure in bar, Weight in Kg, Density in Kg/m3, Translational Stiffness in N/mm, Rotational stiffness in N-m/deg to the neutral file.
    - Similarly Selecting the option “ENGLISH Units” transfers Pipes/Branches details in ENGLISH units i.e. Length related dimensions such as OD, Nominal Size etc in Inch, Temperature in Deg F, Pressure in psi, Weight in lb, Density in lb/in3, Translational Stiffness in lb/in, Rotational Stiffness in lb-in/deg to the neutral file.
- If the user wishes to eliminate those elements whose Nominal size (NS) is less than 50mm / 2in, then they can specify the value as “50” for SI Units and “2” for English Units in the field “Process elements, if dia >”. In other words, the program will process only those elements whose nominal size is greater than the value specified in the field above.
- Select the Boundary Conditions to be used from the form shown above. Refer the section titled “Reference” for details.

- Specify how the 3 Way and 4 Way Valves to be transferred to HOTclash. Refer the section titled “Reference” for details.
- Navigate to the required ZONE/PIPE/BRANCH through the member list as shown in the figure above.
- Press the button “Add CE” to include and to perform the Stress Check for the selected ZONE/PIPE/BRANCH.
- User can also use the button “CE Members” to include all the members of SITE/ZONE/PIPE and then exclude a few members using the “Remove” button if required. For example, if you wish to add 8 PIPES out of 10 PIPES under a particular ZONE, navigate to the ZONE and press the button “CE Members”. Highlight the PIPE (one at a time) in the included list and press the button “Remove” to exclude them.
- By default, “Z Axis” shall be taken as Global Vertical Axis.
- Press the button “Apply” to perform the HOTclash.



5 Figure above shows the deflected shape of Operating Load Condition.

6 Designers can transfer the deflected model by selecting the option available under “Transfer” frame.

Limitations

The following are not transferred to HOTclash from PDMS at this time. However user can add these in HOTclash through Edit Layout->Misc->Section

1 Corrosion allowance and Mill tolerance.

2 Lining Density and Lining Thickness.

Reference

Loads

Temperature and Pressure values entered at Pipe/Branch level via TEMP and PRES attribute shall be transferred to HOTclash. Hence, user should fill these attributes with appropriate values depending upon the Units of transfer. I.e., If you wish to transfer the model in SI units, then the value entered for Temperature and Pressure should be in Deg C and kg/cm2 respectively. On the other hand, if you wish to transfer the model in English Units, then the Temperature and Pressure values shall be entered in Deg F and psi respectively.

User can also add / modify the Temperature and Pressure values in HOTclash through Edit Layout->Misc->Loads.

Fluid Density

Even though the provision is available in PDMS Propcon Database to enter the Fluid density, most of the users do not use such facility. Hence, provision is given to specify the Specific Gravity of the fluid (with respect to water) during the transfer of the model.

Weight

The weights of Valve, Instruments, Flanges, etc. are extracted from the Propcon Database through the “Cweight” attribute. If defined/available in the Propcon Database, the program extracts the information and transfer to HOTclash. Care should be taken while filling the “Cweight” attribute in Propcon. I.e., the values should be specified in Kg, if you to wish to transfer the same in SI units otherwise in lb for English units.

User can add / modify the weight of components by selecting the component type such as Valve, Rigid, Flange, etc. through Edit Layout->Window->List.

Wall Thickness

Since the Wall thickness of the Piping components is generally not available in PDMS, they are set to 0.0 by default. However, user can transfer the Wall Thickness information to HOTclash properly from PDMS (if they are specified) by modifying the variables defined in the program. Refer **Appendix A** for details on modifying the program to extract Wall Thickness from PDMS.

User can also modify the Wall thickness of the piping components directly in HOTclash through Edit Layout->Misc->Section.

OD and Nominal Size

OD and Nominal Size are extracted from the Paragon Database of PDMS. For reducers, the arrive OD and Thickness shall be transferred to OD1 and Thk1 of the element in HOTclash and the leave OD and Thickness shall be transferred as OD2 and Thk2 of the element in HOTclash.

User can also modify the OD and Nominal size of the piping components directly in HOTclash through Edit Layout->Misc->Section.

Boundary Conditions

Selecting the option “Anchor end if connected to Nozzle or Pipelines” will Anchor the Pipe Ends only when they are connected to a Nozzle or Pipelines, otherwise it leaves them as Free. On the other hand, if one end of the pipe is connected to a Nozzle and the other end of Pipe is connected to a Branch and if that Branch is not included as the part of the Stress model, then the program will anchor both the end automatically.

For more clarity, consider the following examples. If one end of the pipe is connected to a Pump Nozzle and the other end is not connected to any Nozzle or Pipeline, then the program will anchor the first end and leave the other end as free (i.e., do not create any support). On the other hand, if one end of the pipe is connected to a Nozzle and the other end is connected to a Branch and that Branch is not included in the Stress model, then the program will anchor both the ends automatically.

Similarly selecting the option “Anchor all Free Ends” will “Anchor” all the ends of the Branches automatically irrespective of whether they are connected to Nozzle or Pipelines.

In addition to the above, user can also add / modify supports in piping system in HOTclash directly through Edit Layout->Misc->Data Types.

Supports

Supports locations and its information are included for transfer from PDMS when the following conditions are met.

Step 1: Include/Exclude ATTA’s for Transfer

Define ATTA and fill the attribute “ATTYPE” with an appropriate Keyword. Use the same Keyword in the text box “Identify Support ATTA’s with ATTYPE attribute set as” (as shown in figure above). Mismatching of Keywords will exclude the ATTA’s from transfer (or) fill the attribute “ATTYPE” with an appropriate Keyword and leave the text box “Identify Support ATTA’s with ATTYPE attribute set as” empty (unfilled) to include all ATTA’s for Transfer.

Step 2: Transfer Support Details

The translator performs the following for transferring the support details to HOTclash.

- Checks for user defined attribute (UDA) “:SUPCODE”. If available, then reads the details of support from this attribute and write them to the neutral file.
- If not available, then checks for user defined attribute “:KPSUPCODE”. If available, then read the details from this attribute and transfer to HOTclash. Please note, this feature is included for users who had used older versions of HOTclash. i.e., User who had used the older version of HOTclash can continue to use the same user defined attribute “:KPSUPCODE” to transfer the support details to HOTclash, without reentering the values to the new attribute.

- Lastly, if both the attributes are not available in PDMS, then the program will read the support details from the “STEXT” attribute of ATTA and transfer the same to HOTclash. This can be used in situations where, the users do not have write access to Dictionary Database of PDMS to create the User Defined attribute.

Any of the attributes defined above should be set a value as given in the field #1 i.e., “PdSupport” of the access db “SupportType.mdb”, when the user selects the option “Use Mapping DB” for transferring the support details to HOTclash. Otherwise, the attribute should be filled with values as specified in **Appendix E** of HOTclash User’s Manual supplied along with the product.

In addition to the above, user can also add / modify supports in piping system in HOTclash directly through Edit Layout->Misc->Data Types.

Material

Material description entered at XTEXT attribute of SMTE is extracted from the Paragon Database and the material property is then obtained from the intermediate mapping db. For more details, refer HOTclash User’s Manual supplied along with the product.

User can add / modify the Material properties in HOTclash through Edit Layout->Misc->Materials.

Thermal Anchor Movement (TAM)

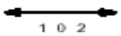
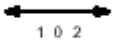
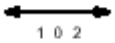
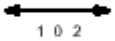
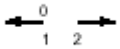
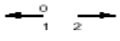
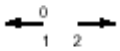
Thermal Anchor Movement (TAM) values entered at UDA :NX, :NY, and NZ in global X, Y and Z directions respectively at Equipment Nozzle where the piping layout (selected for transfer) is connecting to. These values are then transferred to HOTclash. TAM values should be defined in “mm” for PDMS projects in SI units and in “Inch” for PDMS project in English units.

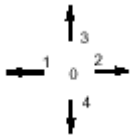
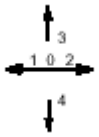
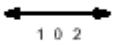
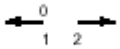
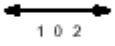
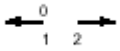
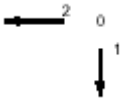
If the Equipment Nozzle to which the Piping Layout is connecting to is not modeled in PDMS, then these TAM values can be entered at UDA :HNX, :HNY and :HNX or :TNX, :TNY and :TNZ at PDMS Branch corresponding to Head or Tail of pipe run. In other words, TAM at starting of the Pipe run should be entered at :HNX, :HNY and :HNZ of PDMS Branch. On the other hand, TAM at the end of the Pipe run should be entered at :TNX, TNY and TNZ of PDMS Branch.

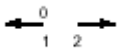
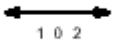
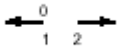
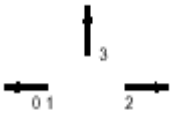
User can also add / modify the Thermal Anchor Movement values through Edit Layout option. i.e., Click Edit Layout then select “Anchor” and select “Edit data” through Layout > Edit. From the dialog box shown, click on “Specified Displacement” and enter the TAM values.

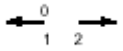
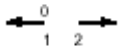
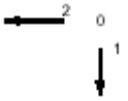
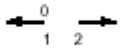
PDMS to HOTclash component Mapping

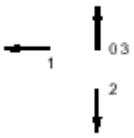
The types of components available in PDMS are simulated as tabulated below in HOTclashPDMS.

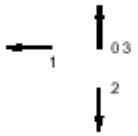
PDMS Component Description	Connection Points	Component in HOTclash	Keyword used in Neutral File
Cap			
Butt weld		Rigid Element	RB
Cap compression		Rigid Element	RB
Cap Screwed		Rigid Element	RB
Cap Socket Weld		Rigid Element	RB
Closure			
Pipe Block		Rigid Element	RB
Pipe Block Variable Length		Rigid Element	RB
Coupling			
Nipple – Screwed, Coupling Compression, Coupling Screwed, Coupling Socket weld, Butt weld Elbolet, Socket Weld Elbolet, Screwed Elbolet		Reducer Concentric	RD
Cross			

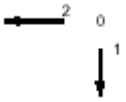
PDMS Component Description	Connection Points	Component in HOTclash	Keyword used in Neutral File
Butt Weld, Socket Weld, Compression, Flanged, Screwed		Four Pipes with Branch SIF (Welding TEE)	CR
Set on, Set on Reinforced		Four Pipes with Branch SIF (Welding TEE)	CR
Blind Flange			
Flange – Blind		Rigid Element or Pipe with Flange	FL
Flange - Reducing Concentric		Rigid Element or Pipe with Flange	FL
Flange Reducing Eccentric		NA	NA
Fixed Length Tube			
Fixed length Pipe with Flanged ends and without Flanged ends.		Pipe	PI
Lap Joint and Stub End			
Lap Joint Ring Loose		Rigid Element or Pipe with Flange	FL
Lap Joint Stub End Loose		Rigid Element or Pipe with Flange	FL
PCOMponent			
Block – Angle		Pipe	PI

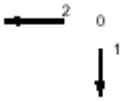
PDMS Component Description	Connection Points	Component in HOTclash	Keyword used in Neutral File
Expansion Bellows, Flame Trap, Flexible Hose, Hose Coupling, Non – Category item, Restrictor Plate, Tundish		Pipe	PI
Plug		Pipe	PI
Sight Glass		Pipe	PI
Slip Plate, Slip Ring, Spectacle Blind		Pipe	PI
Reducer Concentric			
Reducer Concentric Butt Weld, Fabricated from Plate, Swaged from Pipe, Compression, Flanged, Fabricated from Plate Flanged, Swaged from Pipe Flanged, Nipple, Screwed, Socket Weld Bush, Socket Weld & Special Reducing Flange		Reducer Concentric	RD
Reducer Concentric with a Butt Weld Connection, Fabricated Plate Connection, Connection Swaged from Pipe, Connection Flanged, Connection Fabricated from Plate Flanged, Connection Swaged from Pipe Flanged, Screwed Connection and Connection Socket Weld		Reducer Concentric	RD
Reducer Eccentric			

PDMS Component Description	Connection Points	Component in HOTclash	Keyword used in Neutral File
Reducer eccentric Buttweld, Fabricated from Plate and Swaged from Pipe.		Reducer Eccentric	ER
Reducer Eccentric with a Connection Butt Weld, Connection Fabricated from Plate, Connection Swaged from Pipe, Connection Flanged, Connection fabricated from Plate Flanged and Connection Swaged from Pipe Flanged	NA	NA	NA
Eccentric Screwed, Flanged, Fabricated from Plate Flanged and Swaged from Pipe Flanged		Reducer Eccentric	ER
TRAP			
Trap – In Line		Pipe	PI
Trap – Angle		Pipe	PI
Trap – Offset, Trap – Return	NA	NA	NA
UNION			
Union – Screwed, Socket Weld		Rigid Element	RB
TEE or OLET			
Olet - Half Coupling, Nipolet (Screwed, Plain Ended), Sockolet, Thredolet, Weldolet, Tee- Set-on, Set-on Reinforced		Pipe(s) with Branch SIF (Welding TEE) or (Weldolet)	TU/TW/TF/TO

PDMS Component Description	Connection Points	Component in HOTclash	Keyword used in Neutral File
and Tee Pulled			
Olet – Latrolet (Butt Weld, Screwed & Socket Weld)		Pipe(s) with Branch SIF (Welding TEE) or (Weldolet)	TU/TW/TF/TO
Olet – Instrument Flanged, Tee – Butt Weld, Compression, Flanged, Screwed, Socket Weld, Swept Branch Butt Weld, Swept Branch Flanged, Swept Branch Compression and Swept Branch Socket Weld		Pipe(s) with Branch SIF (Welding TEE) or (Weldolet)	TU/TW/TF/TO
Valve			
Valve – Angle (Pressure Reducing, Relief/Vent,		Valve	VA
Valve – Ball, Basic, Butterfly, Cock, Diaphragm, Gate, Globe, Needle, Plug, Pressure Reducing, Relief/Vent and Slide		Valve	VA
Valve – Check		Valve	VA
VENT			
Rupture Disk		Rigid Element	RB
Four Way Valve			

PDMS Component Description	Connection Points	Component in HOTclash	Keyword used in Neutral File
Valve – 4 Way		Four Rigid Elements or Four Pipes with Concentrated Mass	4W
Three Way Valve			
Valve – 3 Way		Three Rigid Elements or Three Pipes with Concentrated Mass	3W
INSTRUMENT			
Instrument, Orifice Plate, Restrictor Plate and Rupture Disk		Rigid Element	RB
Instrument Angle		Rigid Element	RB
Instrument Dial and Dial Flanged		Rigid Element	RB
Valve – Angle Relief/Vent, Angle Pressure Reducing, Angle Control, Angle Control Square Indicator, Angle Control Motorised Indicator, Angle Control Hand Indicator		Rigid Element	RB
Control, Control Square Indicator, Control Motorised Indicator, Hand Indicator, Pressure Reducing and Relief/Vent		Rigid Element	RB

PDMS Component Description	Connection Points	Component in HOTclash	Keyword used in Neutral File
3 Way Control, 3 Way Control Square, 3 Way Control Motorised Indicator and 3 Way Control Hand Indicator		Three Rigid Elements or Three Pipes with Concentrated Mass	3W
4 Way Control Square Indicator, 4 Way Control, 4 Way Control Motorised Indicator, 4 Way Control Hand Indicator		Four Rigid Elements or Four Pipes with Concentrated Mass	4W
ELBOW or BEND			
Elbow – Butt Weld(90 and 45 Deg), Screwed with Female Ends, Elbow Compression, Screwed with Male Ends, Elbow Socket Weld, Elbow Reducing, Bend – Mitre, Lobster Back Butt weld and Lobster Back Bend and Pulled		Bend	EL
Butt Weld with a Connection, Compression with a Connection, Screwed Female with a Connection, Socket Weld with a Connection, Bend Flanged with a Connection, Bend – Mitre with a Connection Flanged, Butt Weld Bend – Mitre with a Connection, Lobster Back with a Connection and Pulled with a Connection		Pipes with Branch SIF (Welding TEE)	TW
Butt Weld 180 Deg Return, Flanged 180 Deg Return and Pulled 180 Deg Return		Bend	EL

PDMS Component Description	Connection Points	Component in HOTclash	Keyword used in Neutral File
FILTER			
Filter/Strainer- Straight Through		Rigid Element	RB
Filter / Strainer Angle		Rigid Element	RB
Flange			
Flange Blind, Flared/Loose Backing, Flange Backing, Flange Reducing Concentric, Screwed, Slip On, Slip On with 'J' Type Weld, Socket Weld and Weld Neck	or	Rigid Element or Pipe with Flange	FL
Orifice Slip On Flange and Orifice Weld Neck		Rigid Element with Tapping	OF

Appendix A

Specifying Wall Thickness

This section explains how to extract the wall thickness for PDMS piping components. To specify the wall thickness for piping components like Pipe, Olet, Tee, Elbow, Reducer and Cross, navigate to “HOTclash” installed path and locate the folder “Setup”. Navigate to the folder “Objects” and then open the corresponding .pml object files in which the thickness needs to be specified.

Locate the variables “!This.WallThickness[1] and “!This.WallThickness[2]” in the file and modify the values to suit the project requirement. By default these variables are assigned to ‘0.00’.

Catalogue Parameter

If wall thickness is defined using Catalogue Parameter of SCOM in PDMS, then the variable can be modified to read the value from Catalogue Parameter. For example, if the Wall Thickness is specified in Catalogue Parameter 3, modify the lines as follows.

!This.WallThickness[1] = !DbRef.catref.Param[3].String()

!This.WallThickness[2] = !DbRef.catref.Param[3].String()

Design Parameter

If Design Parameter (DESPARAM) is used to specify the Wall Thickness, then the variable can be modified to read the value from Design Parameter. For example, if the Wall Thickness is specified in Design Parameter 3, modify the lines as follows.

!This.WallThickness[1] = !DbRef.spref.Desparam[3].String()

!This.WallThickness[2] = !DbRef.spref.Desparam[3].String()

User Defined Attributes (UDA) at Specification component

If User Defined Attribute is used to specify the Wall thickness of the piping component at SPCO level, modify the variable listed below to read the value from UDA. For example, if the Wall Thickness is specified in the variable “WallThickness” of SPCO element, modify the lines as follows.

!This.WallThickness[1] = !DbRef.Spref.:WallThickness.string()

!This.WallThickness[2] = !DbRef.Spref.:WallThickness.string()

User Defined Attributes (UDA) at Piping Component

If User Defined Attribute is used to specify the Wall thickness at piping component, modify the variable listed below to read the value from UDA. For example, if the Wall Thickness is specified in the variable “WallThickness” of piping element, modify the lines as follows.

!This.WallThickness[1] = !DbRef.:WallThickness.string()

!This.WallThickness[2] = !DbRef.:WallThickness.string()